

# Chapter 1: Purpose and Need

## 1.1 INTRODUCTION

The Utah Department of Transportation (UDOT), in conjunction with the Federal Highway Administration (FHWA), is proposing roadway improvements to approximately 3.5 miles of SR-68 (Redwood Road and 500 South) in Davis County, Utah. The project is located approximately three miles north of Salt Lake City (see **Figure 1-1**). *Figures are located at the end of each chapter.* The project begins at the Redwood Road intersection with 2600 South in Woods Cross and continues along 500 South to the I-15 southbound ramps in West Bountiful. The majority of this section of SR-68 is a two-lane road, within a UDOT right-of-way (ROW) of 100 feet from 2600 South to 800 West and 66 feet from 800 West to the I-15 southbound ramps.

The purpose and need for the project is outlined in **Section 1.2**. Further detail regarding the development of the project purpose and need is contained in **Section 1.3** and project objectives are identified in **Section 1.4**. These objectives assist in determining how well the alternatives discussed in **Chapter 2** meet the project purpose and need.

## 1.2 PROJECT PURPOSE AND NEED

The purpose and need for the project is to improve future corridor mobility and accommodate future travel demand through the design year 2030 while providing safe and efficient connections to nearby major transportation facilities (transit, freeways, highways, and trail systems) and correcting geometric and drainage problems.

SR-68 is expected to continue to play an important role in facilitating the efficient and safe movement of people and goods in this area. As such, the purpose of this SR-68 project is to improve future corridor mobility and accommodate future travel demand. Level of Service (LOS) is used to define roadway congestion and operating conditions (and is explained further in **Section 1.3.3**). The desired LOS for the corridor is LOS C or better. Where there are substantial constraints, the minimum acceptable intersection LOS is LOS D through the 2030 design year. Improvements will be provided in a manner that helps connect nearby major transportation facilities (transit, freeways, highways, and trail systems), corrects geometric and drainage problems, and serves as an asset to adjacent communities.

The existing and proposed transportation network within the traffic influence area is shown in **Figure 1-1**. The traffic influence area encompasses the area from which traffic

travels to and from the project corridor. As a UDOT-designated urban principal arterial, SR-68 provides connectivity to I-15 and I-215, as well as to many of the urbanized area's primary transportation facilities and the Skypark Municipal Airport. Within the project limits, SR-68 currently connects with I-15 and provides general mobility and access to industrial areas, other local businesses, and residences. This section of SR-68 is also currently used as a local reliever for a short section of I-15 in the event of delays on I-15. Within the project limits, there are two signalized intersections and two active signed and gated at-grade railroad crossings, the Denver and Rio Grande Western (D&RGW) and the Union Pacific Railroad (UPRR). Within the next few years, SR-68 will also provide an essential link that connects the area to two new north/south transportation corridors, the Legacy Parkway and Commuter Rail.

Much of the area served by SR-68 is currently developed or planned for residential or commercial development (see **Figure 1-1**). The largest residential development along SR-68 includes the Foxboro master planned community in North Salt Lake. Foxboro includes 1,267 residential units platted in 2003, as well as an additional 1,287 units planned north and 120 units planned south of the original platted development (Ottoson, November 15, 2005). In Woods Cross, Valentine Estates and Mountain View Estates are in the process of being developed with over 450 residential units west of SR-68. Additional trips associated with these types of developments are increasing transportation needs in Woods Cross and West Bountiful and place increasing traffic demands on the existing two-lane SR-68 (as explained in **Section 1.3.3**).

Both technical analyses and public input were used to identify the project needs. This approach clearly identified the following needs that the project should address to allow SR-68 to continue to function as a major (urban principal) arterial, serving the communities of Woods Cross and West Bountiful through the 2030 design year.

- Mobility through the corridor is deteriorating and would continue to do so under the No Build condition. By the year 2030, if no action were taken, the travel time through the corridor during the PM peak hour for northbound/eastbound traffic would increase from an average time of nearly seven minutes to over nine minutes. The PM peak hour travel time for westbound/southbound traffic would increase from nearly five minutes to over eight minutes. This increase in travel time is characteristic of the high average delays, or congestion through the corridor. Without improvements, the corridor and most intersections would operate at an unacceptable LOS. The corridor would experience LOS D conditions, especially in the northbound/eastbound direction, and most intersections would operate at LOS F.

- Numerous uncontrolled accesses exist along the corridor. These accesses provide ingress and egress to the industrial areas, other businesses, and residential properties. However, uncontrolled accesses create problems associated with increased conflict points and decreased mobility.
- Since the study portion of SR-68 lacks adequate left and right turning lanes, drivers often make turning movements from the through travel lane. These turning movements are a major contributor of the crashes and delays on this portion of SR-68.
- The existing project corridor does not adequately accommodate multi-modal uses of the corridor. Bicyclists are traveling in the travel lane or on narrow shoulders, and pedestrians do not have continuous sidewalks. Transit users will also be dependent on SR-68, especially the 700 West intersection, for their access to and from the Woods Cross Station. The 700 West intersection is currently operating at LOS C, but by the year 2030 is expected to be operating at LOS F.
- Several existing geometric conditions do not meet current design standards and inadequate drainage is also causing problems along the corridor. These deficiencies contribute to poor traffic operations and crashes.

### **1.3 ESTABLISHING PROJECT PURPOSE AND NEED**

This section provides a summary of the technical analyses conducted to define existing and future conditions along the SR-68 project corridor. The analyses examined the additional transportation demands placed on SR-68 in the future as reflected in the projected population and employment growth, as well as state, regional, and local plans. Existing and projected traffic operations were evaluated, along with other conditions such as existing roadway deficiencies, vehicular and pedestrian safety, transit needs, and bicycle use.

#### **1.3.1 State, Regional, and Local Plans**

Improving SR-68 is a transportation planning goal at the state, regional, and local levels as demonstrated in the following plans:

- **2004-2030 Wasatch Front Urban Area Long Range Transportation Plan (LRP)** – The LRP is the Wasatch Front Regional Council's (WFRC) federally mandated regional transportation plan that recommends SR-68 be improved from two through lanes to four through lanes (WFRC, 2003b). The 500 South portion of

SR-68 is included in the first phase (prior to 2012), and Redwood Road is included in the second phase (prior to 2022). A 2007-2030 Regional Transportation Plan is in the process of being developed that will replace the 2004-2030 LRP.

- **2007-2012 WFRRC Transportation Improvement Program (TIP)** – The TIP is the WFRRC’s five-year transportation program. This program has allocated funds for improvements between 1100 West and the I-15 southbound ramps (WFRRC, 2006). The 2007-2012 WFRRC TIP was recently approved and replaces the 2006-2010 WFRRC TIP (WFRRC, 2005b) referenced in this EA.
- **2007-2012 Statewide Transportation Improvement Program (STIP)** – The STIP is UDOT’s five-year transportation plan. UDOT’s plan includes funding of improvements of SR-68, between 1100 West and I-15 (UDOT, 2006d). The 2007-2012 STIP replaces the 2006-2010 STIP (UDOT, 2005b) referenced in this EA.
- **1997 Transportation Element of the West Bountiful General Plan** – The 1997 Transportation Element supplements the 1990-2010 West Bountiful Master Plan (West Bountiful, 1992). The 1990-2010 West Bountiful Master Plan serves as the city’s primary planning tool for managing and coordinating future growth and is in the process of being updated. The 1997 Transportation Element views this portion of SR-68 as the only western alternative to get around bottlenecks on this section of I-15. The plan encourages increased capacity and safety on 500 South, and suggests limiting and consolidating driveway entrances and providing signal protected left turns at I-15 (West Bountiful, 1997).
- **2003 Woods Cross General Plan**– Woods Cross uses this plan as its primary tool for evaluating development proposals. Future transportation planning needs are addressed in this plan. The plan identifies SR-68 as an important corridor that will connect to the planned Legacy Parkway interchange at 500 South. This connection will provide access to the city from the west. The city also plans to develop a regional commercial center as part of a mixed-use development zone west of the current town center and adjacent to SR-68 near this planned interchange. The plan also includes implementing beautification features to emphasize the SR-68 corridor as a gateway to the city (Woods Cross, 2003). Woods Cross is currently working with UDOT to better define the city’s vision for this corridor, which will be reflected in their 500 South Corridor Plan (Woods Cross, 2006).

### 1.3.2 Population and Employment Growth

Existing and projected changes in population, employment, land use, and zoning have brought about the need to provide improvements to sustain corridor mobility. By the year 2030, the number of households and population in the traffic influence area are projected to increase by 93 percent and 64 percent, respectively. Employment is projected to increase by 87 percent (WFRC, 2005a). In Davis County, an average of 2,600 residential building permits was issued annually between 2000 and 2004. The recent and anticipated residential growth has been focused west of SR-68 in North Salt Lake (Foxboro) and Woods Cross (Valentine Estates and Mountain View Estates). The analysis conducted for the Legacy Parkway project projected that residential growth trends are anticipated to continue in Davis County, resulting in the annual conversion of approximately 600 acres of low-intensity land uses (i.e., agricultural, grazing, idle) to residential development and 100 acres to non-residential development (UDOT, 2005a). The cities of Woods Cross and West Bountiful have developed their local plans to guide this projected development in order to maintain the quality of life in these communities.

The projected population growth in the project corridor and surrounding communities has created a scenario conducive to economic development. Commercial properties along SR-68 that are currently under development include a mix of uses in Foxboro, warehouse and office development along 2425 South, and a commercial node at 1500 South. Economic development trends are further supported by Woods Cross' plans for a regional commercial center adjacent to SR-68 near the planned Legacy Parkway interchange at 500 South. Two mixed-use developments are planned for Woods Cross – the Village Green Neighborhood and transit oriented development (TOD) associated with the proposed Commuter Rail Station. Village Green is planned on approximately 60 acres as a new mixed-use neighborhood south of 500 South and west of 1100 West. The Commuter Rail Station will be located just south of 500 South on 800 West. This station will bring additional vehicle and pedestrian traffic to the area and provide an opportunity for TODs just west of the station that are conducive to high transit ridership. The increasing traffic demands that are being placed on the existing two-lane road are explained further in **Section 1.3.3**.

### 1.3.3 Traffic Operations

This section provides a summary of the traffic operations analysis. Further detail is provided in **Section 2.4.3** and the SR-68, 2600 South to I-15 in Davis County Traffic Report (Fehr & Peers Associates, Inc., 2006, included as **Appendix B**). *All Appendices are included on the enclosed CD.*

The capacity of a roadway is primarily a function of the roadway's configuration (e.g., number of lanes, number and type of intersections, width of lanes, and number of driveways). In order to determine if a roadway, in this case SR-68 from 2600 South to I-15, has the capacity to accommodate future traffic volumes, it is necessary to:

- Project population growth and development that can be reasonably expected to occur by the 2030 design year (see **Section 1.3.2**);
- Forecast traffic volumes for the 2030 design year using a recognized and accepted travel demand forecasting model; and
- Analyze future traffic operations that would occur if the current roadway's configuration remains the same (i.e., traffic impacts of the No Build condition).

Since the WFRC is the metropolitan planning organization (MPO) for the Salt Lake and Ogden areas and is responsible for coordinating the transportation planning process, its regional travel demand forecasting model was used (WFRC, 2005a). The 2030 highway and transit network represented in the WFRC model was assumed to be implemented. This network includes the following projects relevant to the SR-68 traffic analysis:

- Legacy Parkway (new facility);
- I-15 from 600 North in Salt Lake to the US-89 / I-15 Junction (lane addition and interchange improvements); and
- Regional Commuter Rail between Salt Lake and Ogden (new facility, including a station just south of 500 South on 800 West in Woods Cross).

Key elements in the WFRC travel demand modeling process include defining the traffic influence area and regional population and employment projections. The traffic influence area is shown in **Figure 1-1**. The WFRC's socioeconomic data was used for population and employment projections. This data originates from the Governor's Office of Planning and Budget (GOPB). Land use forecasts along the corridor represent existing and planned development. Trip generators are currently comprised of residential, commercial, and light industrial uses. Residential development, which is expected to increase in the corridor over time, generates most of its trips during peak commute hours with morning trips serving work, school, retail, and evening trips also serving recreation. Commercial and industrial land uses tend to generate more trips, including a higher proportion of truck traffic, that are generally spread throughout the day during off-peak hours.

Traffic volumes on SR-68 currently range from just over 6,535 vehicles per day (vpd) along Redwood Road to 17,205 vpd along 500 South near I-15. The travel demand

modeling process shows that by the 2030 design year, SR-68 traffic volumes are forecasted to increase to as much as 20,750 vpd with or without improvements. On a daily basis, approximately eight percent of existing traffic is trucks. The truck percentage on an hourly basis peaks near 10 percent; however, this peak occurs during periods of low total traffic volume. During the peak traffic hours, trucks comprise approximately two percent of the vehicles using SR-68.

A transportation system's operational performance is typically evaluated during one hour of a three hour peak traffic period. The peak traffic period is determined by assessing traffic volume characteristics and generally occurs during the AM or PM commute times. For this study, the PM peak period was shown to have higher traffic volumes than the AM peak period. As such, the PM peak hour was identified as the controlling peak hour. During the PM peak hour, traffic volumes are higher for northbound and eastbound travel than for travel in the opposite direction. Average conditions throughout the peak hours were examined. By averaging results over the entire peak hour, typical conditions experienced by travelers during the peak hour are reported, as opposed to just highlighting conditions experienced by a small proportion of peak hour travelers. For example, a proportion of peak hour travelers experience rail gates closing and blocked traffic flows, and others may not be affected at all by these conditions.

One measure used to assess the impacts of increasing traffic volumes within a corridor is to compare the existing and future LOS. LOS is a quantitative measure of traffic operating conditions expressed as a letter designation that varies from LOS A (the best service conditions) to LOS F (the worst service conditions). In general, roadways are designed to provide a balance between the highest feasible LOS and consistency with expected operating performance, taking into account acceptable speeds, degrees of congestion, turning lanes, passing sections, intersections, and interchanges. Other measures that can also be used to assess impacts include determining the increase in network delay experienced by motorists at intersections and the change in overall corridor speed and travel time.

In general, the traffic analysis indicates that traffic congestion will increase in the future with or without improvements. Therefore, in order to assure safe and efficient corridor operations on this section of SR-68, there is a need to develop and implement improvements that address the issue of increased traffic volumes and congestion. The traffic analysis uses the No Build scenario, which has a transportation network that includes all projects in the WFRC's LRP except this project, to establish the predicted base conditions for the year 2030. The following bullets summarize the findings of the traffic analysis for the 2030 PM peak hour under the No Build scenario.

- **2030 PM Peak Hour Directional Volumes** – By the year 2030, the PM peak hour volumes are as high as 1,875 vehicles per hour (vph). Volumes increase over existing conditions an average of 74 percent for the westbound / southbound direction (from I-15) and 46 percent for the northbound / eastbound direction (towards I-15).
- **2030 PM Peak Hour Average Delay and LOS** – The traffic operations analysis indicates high average delays and poor LOS will be experienced by the year 2030. The average network delay is expected to increase to over five minutes of delay per vehicle. This represents a 290 percent increase over existing conditions. Major intersections would experience LOS F conditions, and the corridor would experience LOS D conditions in the PM peak hour (especially in the northbound / eastbound direction).
- **2030 PM Peak Hour Corridor Travel Time** – By the year 2030, travel time increases over existing conditions approximately 38 percent for northbound / eastbound travel and 68 percent for westbound / southbound travel. Travel time through the corridor during the PM peak hour for northbound / eastbound traffic would increase from an average time of nearly seven minutes to over nine minutes. The PM peak hour travel time for westbound / southbound traffic would increase from nearly five minutes to over eight minutes.

### 1.3.4 Modal Interrelationships

#### 1.3.4.1 Transit

SR-68 will become a primary route that connects users of Commuter Rail with the Woods Cross Station, located just south of SR-68 on 800 West. Because of safety issues, the south leg of the 800 West intersection with SR-68 has been closed by the Commuter Rail project and 700 West will be used to provide users access to this station. The Commuter Rail project forecasts that on opening day (2008) there will be approximately 400 daily boardings at the Woods Cross Station. This is expected to increase to approximately 1,450 by year 2030. The Commuter Rail project will add six closures of the gates at the UPRR rail crossing during AM and PM peak hours. These closures would be in addition to the four gate closures associated with UPRR trains that commonly occur during peak hours.

The Utah Transit Authority (UTA) is currently re-evaluating the Salt Lake Valley's entire bus system and expects major route changes throughout the valley. Currently, UTA provides no regularly-scheduled bus service along Redwood Road. However, Bus Route 60 provides service to 800 West and stops at 500 South (UTA, 2006). Because of the two-



lane configuration and the lack of shoulders, if bus service were provided along the corridor, buses would stop through traffic to pick up and/or discharge passengers. Buses stopping in the travel lane would pose potential safety issues and further reduce corridor mobility.

In order to encourage use of transit services, transit users must be able to safely and efficiently access bus stops and the Woods Cross Commuter Rail Station. Therefore, in order to assure that safe and efficient modal interrelationships continue, there is a need to develop and implement an action that addresses these transit-related issues.

#### **1.3.4.2      Bicyclists and Pedestrians**

The network of existing and planned trails is shown in **Chapter 3** (see **Figure 3-4**). The WFRC is currently updating the Bicycle and Trails Plan for the urbanized areas of Weber, Davis, and Salt Lake counties. WFRC plans to incorporate the results of each county's Trails Master Plan into its upcoming 2007-2030 Regional Transportation Plan. WFRC uses the 1999 American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities to define bicycle trail types. Based on WFRC's 2004-2030 LRP (map dated August 2003), planned Class I (Shared Use Path) routes applicable to the project include the Legacy Parkway Trail and D&RGW Rail Trail. Planned Class II (Signed Shared Roadway) routes include the section of Redwood Road south of 2600 South, the section of 500 South between the Legacy Parkway and Redwood Road, and the section of 2600 South between the Legacy Parkway and Redwood Road. Planned Class III (Shared Roadway, No Bikeway Designation) routes include the section of Redwood Road between 2600 South and 500 South, as well as both 1500 South and 2600 South east of Redwood Road.

The Davis County Trails Master Plan (dated September 13, 2005) identifies a system of interconnecting trails throughout the county that provide alternate transportation routes and access to open spaces. Planned trails applicable to the project area include the Legacy Parkway Trail and D&RGW Rail Trail.

On a local level, both Woods Cross and West Bountiful have developed plans that address pedestrian and bicycle use. Both cities plan to provide a network of multi-purpose trails and pedestrian pathways to connect neighborhoods with schools, parks, retail centers, and work environments. West Bountiful notes that priority should be given to the construction of additional sidewalks and paths that provide connections between primary school routes between 800 West and 500 West, heavily used recreation paths, and bus waiting areas (West Bountiful, 1997). Woods Cross plans identify 500 South as a proposed street trail with a bicycle lane and Redwood Road as a signed shared roadway

bicycle route. Street trails are also indicated for connecting roads, including 2600 South, 1500 South, 1100 West, and 700 West. More recently, Woods Cross has indicated that they no longer desire a street trail or signed bicycle route for 500 South or Redwood Road, but instead plan to encourage the use of lower volume roads (such as 1100 West), and roads that have separated crossings with I-15 (such as 1500 South) to provide primary connectivity for these users (Uresk, September 28, 2006).

Woods Cross and West Bountiful both identify a canal trail following the A1 and A1-A drains that would cross the SR-68 corridor in two locations (Redwood Road at 1900 South, and 500 South at 1500 West). This A1/A1-A Trail would generally run north-south and would provide connectivity to the proposed Legacy Parkway Trail. Both cities also plan for the D&RGW Rail Trail along ROW currently owned by UTA. The cities do not expect the D&RGW Rail Trail to cross 500 South. Additional trails may be developed as part of site plan/subdivision approvals.

Even though bicyclists and pedestrians will be encouraged to use other routes, there is still a need to address the issue of pedestrian and bicycle use, as well as the related potential safety hazards, along SR-68. While in many ways safety is primarily related to traffic volumes, there are other features that influence the safe operation of a highway. These other features include sidewalks and sidewalk conditions, shoulder widths, and overall highway configuration. The problem associated with bicycle use along the project corridor is primarily the lack of consistent shoulders wide enough to accommodate bicycles. Existing shoulders are generally one-foot wide, and the number of uncontrolled accesses and turning conflicts are not conducive to safe and efficient bicycle travel. There are no sidewalks on either side of SR-68 between 2600 South and 1300 West to facilitate pedestrians. Sidewalks are intermittent on the south side of 500 South between 1300 West and 800 West. The only location where sidewalk currently exists on both sides of 500 South is between the UPRR line and I-15. Deficiencies in pedestrian facilities include gaps in sidewalks, lack of handicap ramps, and inadequate layout and slope requirements per the Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

#### **1.3.4.3      General Aviation**

The Skypark Airport is a privately-owned, general aviation-oriented facility and is located adjacent to and east of the project corridor. Access to the airport is from Redwood Road at approximately 1800 South. Airport zoning allows for airport and airport-related services including light manufacturing business parks, professional offices, and research and development spaces associated with the airport (Woods Cross, 2003). There are no height restrictions applicable to the project corridor as a result of flight patterns (Page, October 3, 2006).

#### **1.3.4.4      Other Railroad Activities**

The UPRR rail line located at 800 West and 500 South serves three users: UPRR, Holly Oil, and the Utah Transit Authority. The use of the UPRR line by UTA for Commuter Rail is discussed in **Section 1.3.4.1**. Currently, approximately 36 UPRR trains cross this intersection each day with no set schedule. Commuter Rail will create 58 more crossings per day.

Holly Oil Corporation operates the Holly Refinery just west of 800 West and 500 South. The refinery uses railcars on the UPRR line to receive necessary chemicals and supplies for their refining processes and loads railcars with their finished products. Currently, approximately 20 rail car switches take place per week on the east side of the refinery and as a result, 500 South traffic is blocked during the switch. The trains are allowed to block the road crossing for up to five minutes if the trains are not in motion. They can block the tracks for an unlimited amount of time as long as the train remains in motion. The switches can last up to 30-45 minutes and the schedule is dependent on other train travel on the tracks.

The D&RGW line at this location is used solely by Holly Refinery for deliveries of railcars from the UPRR line. Future deliveries on the D&RGW line are not anticipated to block traffic on 500 South for extended periods of time.

#### **1.3.5      Traffic Safety**

The UDOT Traffic and Safety Division generated a three-year crash history (from 2001 to 2003) for the project corridor. The results of this history indicate the severity and occurrence of crashes is lower than would be expected for this type of corridor. However, a detailed review of historical crash data shows the following profile for different types of collisions:

- 34 percent rear end crashes;
- 26 percent right angle crashes;
- 15 percent single vehicle crashes;
- 14 percent left turn crashes; and
- 11 percent other.

The high occurrence of rear end and right angle collisions suggests inadequate auxiliary lanes (i.e., right and left turn lanes, medians, and shoulders), or high travel speeds for roadway conditions. Though vehicle crashes are occurring around railroad crossings, they are not attributed to vehicles crashing with trains. However, vehicles making u-

turns while the railroad crossing gates are down do contribute to crashes. Inconsistent roadway cross-sections, such as varying shoulder width, also contribute to crashes. Deficiencies associated with the roadway cross-section are discussed further in **Section 1.3.6**.

### **1.3.6 Roadway Deficiencies and Drainage Problems**

Deficiencies in roadway geometrics often contribute to poor traffic operations and crashes. Roadway deficiencies are determined based on an evaluation of the existing geometric conditions of the corridor compared to current design standards. Current design standards from UDOT and the AASHTO were used for this evaluation. These design standards are based on the design speed of the corridor. For this urban arterial, the recommended design speed can vary from 30 to 60 miles per hour (mph), depending on the setting of the roadway. Three different design sections were identified using the posted speed and the context of the area. The posted speed limit of each section is as follows:

- **Section 1 (55 mph)** – 2600 South to Reference Post (RP) 67. RP 67 is the beginning of the transition of Redwood Road and 500 South.
- **Section 2 (45 mph)** – RP 67 to 1100 West.
- **Section 3 (35 mph)** – 1100 West to I-15.

The analyses of the existing geometrics on SR-68 were performed using the 500 South Corridor Needs Assessment (UDOT, 2004), field reviews, survey data, and aerial mapping. The deficient geometric elements within the project limits include flat grades, horizontal curves, and cross-sectional features. The following paragraphs provide a summary of the geometric conditions of the project corridor. Further detail is available in the SR-68, 2600 South to I-15 in Davis County Existing Infrastructure and Geometric Conditions Report (H.W. Lochner, 2005, included as **Appendix C**).

Existing grades on the corridor vary from 0.03 percent to 2.91 percent. The minimum and maximum recommended grade for this roadway to meet the design standards is 0.5 percent and 7.0 percent, respectively. Three grades in Section 1 do not meet the minimum grade of 0.5 percent. Flat grades can cause poor drainage of the roadway, which in turn can compromise safety and traffic operations.

Each of the 10 vertical curves along the project corridor meets current design standards. The horizontal curve that transitions Redwood Road to 500 South is the only horizontal curve on the corridor that does not meet design standards. This curve is designed for a

speed of 15 mph. The posted speed prior to this curve is 45 mph and advisory speed limit signs of 30 mph are provided.

The existing cross-section of SR-68 has a variety of deficiencies. These include clear zone hazards, narrow lane widths, and inadequate shoulders. In addition, intersection geometry (especially acceleration and deceleration lanes) at seven intersections is deficient.

Clear zone is the area adjacent to the travel way that is clear of obstructions that could impede the safe recovery of a vehicle that has left the traveled way. Clear zone area is dependent on the context of the roadway cross-section and the design speed of the corridor. The desired minimum clear zones for Sections 1 and 2 are 30 feet and 18 feet, respectively. Section 3 generally has curb and gutter. In this type of section, clear roadsides are often impractical. In such areas, a minimum clearance between curb face and objects of 1.5 to 3 feet should be provided. There are many existing clear zone hazards throughout the corridor. Obstructions include power poles on the east side of Redwood Road and the south side of 500 South, mailboxes and signs, inadequate protection of railroad apparatus at the D&RGW railroad crossing, and roadway side slopes and ditches. Most of the side slope deficiencies occur in Sections 1 and 2 and are steep side slopes associated with ditches.

The existing width of travel lanes typically meets the recommended width of 12 feet. However, there is a portion of Section 3 (from 800 West to I-15) where the lane widths are only 11 feet. Generally, the shoulder width on the corridor is deficient with a one-foot usable shoulder for Sections 1 and 2. Between 1100 West and 800 West, the shoulder width varies between 1 and 30 feet. The shoulder is wider (27 to 30 feet) in locations where ROW was set back when the property was developed. From 800 West to I-15, the shoulder width ranges from 2 to 14 feet, but is typically two to three feet.

AASHTO (2004) states that well-designed and properly maintained shoulders provide a place for a vehicle to stop because of mechanical difficulties or emergencies, as well as conduct evasive maneuvers to avoid potential crashes. Shoulders should provide a sense of openness that contributes to driver comfort, as well as improve sight distance and lateral clearance from obstructions, thereby increasing safety. Shoulders should also provide space for maintenance operations (e.g., snow removal and storage), and allow for use by bicycles, pedestrians, mail delivery, and buses. Woods Cross and West Bountiful have expressed a desire for shoulder widths that would discourage on-street parking, especially in proximity to intersections, but that are wide enough to allow for use by disabled vehicles.

A 12-foot shoulder would meet all UDOT and AASHTO guidelines, match the current UDOT Region One shoulder width guidance for this type of facility, and accommodate the shoulder widths outlined in city transportation master plans. A four-foot shoulder would meet minimum AASHTO guidelines, but would not meet all UDOT standards, would not match the current UDOT Region One shoulder width guidance, and would not accommodate the shoulder widths outlined in city transportation master plans.

A 12-foot shoulder is recommended from a safety perspective because of the high volume of traffic and number of trucks using this road. However, in the tightly constrained section between 800 West and 700 West, the minimum AASHTO guidance (four-foot shoulder) should be considered in context with the surrounding built environment and increased cost.

Pavement conditions were identified through a visual distress survey that was performed by UDOT in 2001 as part of the 500 South Corridor Needs Assessment (UDOT, 2004). The pavement is in fair condition, but is nearing the end of its life cycle. The pavement is expected to fail within the next ten years. In addition, some rutting and shifting of the pavement near the railroads is occurring. Over the next few years, 500 South is planned a haul route for the Legacy Parkway construction project, which may cause further pavement damage.

The Mill Creek Canal Box Culvert is the only minor structure within the corridor. This is a complex, 550-foot long, double-barrel box culvert that includes one 8-foot by 4-foot box, and one 10-foot by 4-foot box. The culvert runs under 500 South (from south to north) and visual inspection indicates that it appears to be in good condition.

Storm drainage consists of open ditches, roadside swales, intermittent sections of curb and gutter, and a piped drainage system. Ponding of water along the east side of Section 1 encourages vegetation to grow and encroaches into the clear zone of the roadway. The drainage systems eventually discharge into open ditches and subsequently into either the A1 or A1-A drain. The original drainage system was installed in the 1950's and has been added to over the years as individual properties have been developed. Overall, the piped system seems to be in good condition; however, some sections are blocked or undersized, and maintenance of the pipes is required because of siltation and other flow restrictions at the end of the pipes.

## **1.4 PURPOSE AND NEED OBJECTIVES**

The project purpose and need has been developed using information gathered from both technical analyses (described in the previous sections) and the public involvement process

(detailed in **Chapter 6**). A set of purpose and need objectives was developed (as shown in **Table 1.4-1**) to assist in determining how well an alternative addresses the project purpose and need. Additional objectives that should be achieved by the project are shown in **Table 1.4-2**. The No Build Alternative, along with the Build Alternative that best addresses the purpose and need outlined for this project, is analyzed further in this Environmental Assessment (EA).

**TABLE 1.4-1: PURPOSE AND NEED OBJECTIVES**

Project Purpose and Need Component	Measures of Effectiveness
Improve future corridor mobility and accommodate future travel demand through the design year 2030.	<p>Provide the best LOS and overall travel time through the corridor through the design year 2030 that can be achieved in balance with resulting impacts to the built and natural environment. The desired corridor LOS is LOS C or better. Where there are substantial constraints, the minimum acceptable intersection LOS is LOS D through the 2030 design year.</p> <p>Provide improvements in a manner that is compatible with development plans of Woods Cross and West Bountiful. Improvements that do not prevent implementation of development plans are considered compatible.</p> <p>Provide effective access management. Control left turn movements at signalized intersections and at other locations based on UDOT traffic and safety criteria. Consolidate accesses such as side streets, where reasonable access can be maintained.</p> <p>Separate turning movements from through traffic.</p>
Provide a safe and efficient facility with connections to nearby major transportation facilities (transit, freeways, highways, and trail systems).	<p>Meet current UDOT and AASHTO design guidance and practice.</p> <p>Provide a continuous shoulder that meets current UDOT, AASHTO, and UDOT Region One guidance for shoulder width to achieve the benefits outlined by AASHTO guidance. Where there are substantial constraints, the minimum AASHTO shoulder width should be considered.</p> <p>Provide continuous sidewalk that meets ADA requirements.</p> <p>Accommodate bicycle use and future bus stops outside of the through travel lanes.</p> <p>Provide safe and efficient SR-68 mobility and intersection improvements that accommodate users of the Woods Cross Commuter Rail Station.</p> <p>Connect with Legacy Parkway and I-15 improvements.</p>
Correct geometric and drainage problems.	<p>Meet current UDOT and AASHTO design guidance and practice.</p> <p>Enhance storm drainage system to minimize off-site drainage.</p>
Note: Financial constraints, as well as additional project objectives (see <b>Table 1.4-2</b> ) also play an important role in the decision process.	

**TABLE 1.4-2: ADDITIONAL PROJECT OBJECTIVES**

<b>Context Sensitive Solutions Component</b>	<b>Measures of Effectiveness</b>
Serve as an asset to the City of Woods Cross and West Bountiful.	Achieve the purpose and need for the project in partnership with the City of Woods Cross and West Bountiful to accommodate and implement appropriate elements of their plans. Improvements that are compatible with or implement elements of the plans are considered to be an asset.
Note: The purpose and need components (see <b>Table 1.4-1</b> ) must be achieved. Financial constraints play an important role in the decision process. CSS improvements may require additional funding by the cities and / or other funding partners.	